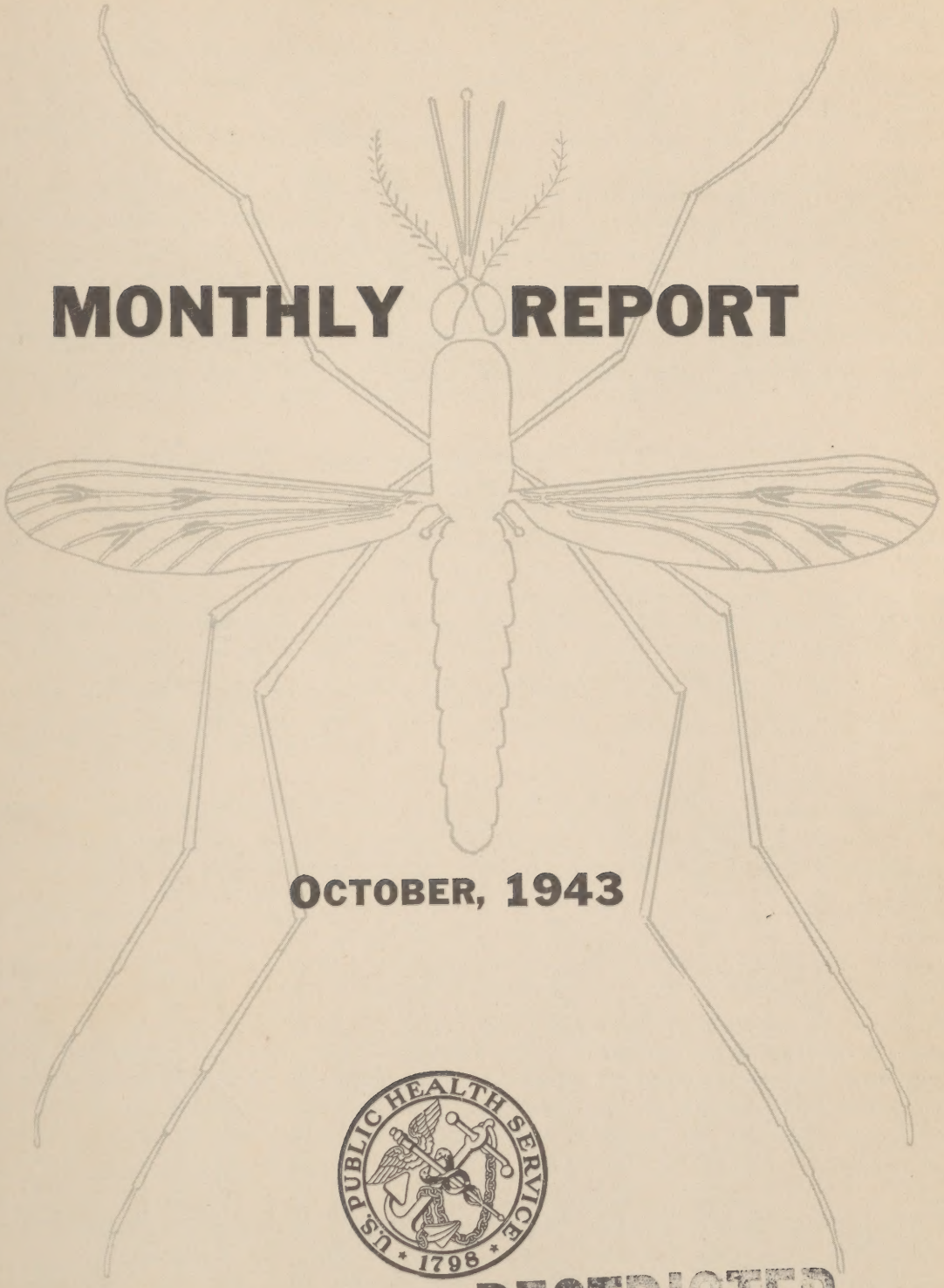
MALARIA CONTROL IN WAR AREAS



MONTHLY REPORT

OCTOBER, 1943

RESTRICTED

FEDERAL SECURITY AGENCY
U. S. PUBLIC HEALTH SERVICE
ATLANTA, GEORGIA

TABLE I — MCWA LARVICIDE AND MINOR DRAINAGE PROJECTS — OCTOBER 1 - 31, 1943

STATE	Areas in Operation	War Establishments Protected	LARVICIDAL WORK: Larvicide Used: Oil Gals.	Larvicide Used: Paris Green Lbs.	Surfaces Treated Acres	OTHER WORK: Ditching Cu.Yds.	Ditching Lin.Ft.	Cleaning Lin.Ft.	Clearing Acres	Water Surf. Eliminated Acres	Total Man Hours	Total Men Employed
Alabama	6	64	328	8	18.2	470	2,372	27,383	1.1	0.5	6,622	38
Arkansas	14	63	14,691	415	1,156.0	1,224	17,944	151,875	6.0	3.7	25,641	139
California	3	11	4,001	---	340.3	35	420	3,509	17.0	0.2	4,096	21
D.C.	1	23	---	---	---	577	6,311	519	2.1	1.0	2,606	16
Florida	17	91	3,729	74	270.6	10,024	31,969	248,955	28.1	79.7	39,391	206
Georgia	14	93	107	2,086	2,356.4	495	4,909	108,690	55.0	3.4	26,128	126
Illinois	2	54	878	798	819.2	172	475	1,675	---	2.1	3,728	18
Indiana	1	40	350	6	77.4	---	---	---	0.2	---	1,688	7
Kentucky	4	48	100	---	15.8	259	1,285	6,242	5.5	0.4	4,833	25
Louisiana	8	71	94,337	2,650	7,605.7	2,169	27,576	56,361	81.5	12.3	68,005	368
Maryland	2	21	5	1	1.2	764	5,016	20,525	1.6	5.7	4,304	17
Mississippi	12	50	5,130	98	262.4	369	6,883	149,988	72.5	0.9	16,368	96
Missouri	5	24	2,370	195	303.4	387	3,324	17,755	3.7	4.5	6,672	34
North Carolina	9	69	3,474	34	236.3	913	7,440	283,273	123.8	12.1	34,435	166
Oklahoma	5	21	6,270	187	576.8	416	3,100	12,000	7.9	2.0	7,220	36
Puerto Rico	5	22	1,290	7,844	11,646.2	145	30,028	91,308	31.7	43.6	65,579	438
South Carolina	18	101	5,139	317	517.5	2,181	13,304	484,835	146.7	2.7	41,851	221
Tennessee	7	69	17,593	50	552.6	611	5,491	46,800	10.4	3.2	13,386	69
Texas	14	119	12,828	249	751.8	2,231	19,588	420,246	120.8	14.9	42,747	228
Virginia	4	83	4,221	180	165.7	773	95,897	32,880	40.9	---	24,234	139
Total	151	1,137	176,841	15,192	27,673.5	24,215	283,332	2,164,819	756.5	192.9	439,534	2,408
September Total	158	1,137	210,349	21,276	35,036.8	16,876	229,470	2,704,053	1,115.5	201.4	465,001	2,559

TABLE II — MCWA MAJOR DRAINAGE PROJECTS — OCTOBER 1 - 31, 1943

STATE	No. of Projects	Clearing Brushing Acres	Channel or Ditch Cleaning Lin.Ft.	New Ditching: Hand	New Ditching: Lin.Ft. Mach.	New Ditching: Dynamite	New Ditching: Total Cu.Yds.	Fill Cu.Yds.	Ditch Lining Placed: Sq.Ft.	Ditch Lining Placed: Lin.Ft.	Underground Drains Lin.Ft.	Water Surf. Eliminated Acres	Total Man Hours
Alabama	2	---	---	860	---	---	297	98	---	---	---	3.2	3,052
Arkansas	1	7.5	---	---	2,550	---	18,012	---	---	---	---	8.0	1,188
Florida	1	---	325	---	---	900	6,000	---	---	---	---	---	859
Missouri	1	---	---	---	---	---	---	---	---	---	---	---	1,816
North Carolina	3	5.7	7,069	11,726	1,720	---	8,343	325	---	---	512	14.8	9,935
Puerto Rico	4	2.2	2,700	1,125	---	150	1,218	312	1,389	---	---	---	56,595
South Carolina	3	5.8	34,505	7,246	900	---	3,983	21	---	---	---	4.0	8,610
Texas	2	0.3	---	1,270	---	---	484	---	---	---	---	---	1,356
Virginia	1	---	1,580	---	---	---	---	---	---	826	---	---	1,044
Total	18	21.5	46,179	22,227	5,170	1,050	38,337	756	1,389	826	512	28.0	84,455
September Total	13	37.4	30,321	22,007	3,850	1,800	31,443	434	6,549	800	30	16.0	70,745

TABLE III — MCWA PERSONNEL ON DUTY ON OCTOBER 31, 1943 AND TOTAL PAYROLL FOR MONTH OF OCTOBER — OCTOBER 1 - 31, 1943

STATE	Commissioned: No.	Commissioned: Pay	Prof. & Sci.: No.	Prof. & Sci.: Pay	Sub-Prof. (1): No.	Sub-Prof. (1): Pay	C. A. F.: No.	C. A. F.: Pay	Custodial: No.	Custodial: Pay	Total: No.	Total: Pay	Percent of Total: No.	Percent of Total: Pay
Alabama	5	1,385	1	325	1	274	2	410	40	5,711	49	8,105	1.6	1.9
Arkansas	5	1,442	3	633	22	4,694	4	776	112	14,996	146	22,541	4.9	5.2
California*											31	3,048	1.0	0.7
D. C.	1	333	1	319	3	550	2	367	9	1,511	16	3,080	0.5	0.7
Florida	4	1,084	5	1,573	22	4,300	5	888	187	26,219	223	34,064	7.4	7.9
Georgia	4	1,189	4	1,038	36	6,764	6	787	90	12,032	140	21,810	4.7	5.2
Illinois	3	866	3	741	2	416	3	550	7	2,064	18	4,637	0.6	1.1
Indiana	1	285	1	263	1	183	1	146	7	920	11	1,797	0.4	0.4
Kentucky	2	570	4	1,110	4	854	3	556	20	2,780	33	5,870	1.1	1.4
Louisiana	9	2,615	7	2,302	32	7,361	4	842	211	36,545	263	49,665	8.8	11.6
Maryland	---	---	---	---	1	409	2	410	18	2,404	21	3,223	0.7	0.8
Mississippi	4	1,189	1	264	14	2,753	3	380	74	10,279	96	14,865	3.2	3.5
Missouri	2	570	1	264	12	2,332	4	726	19	3,848	38	7,740	1.3	1.8
North Carolina	6	1,719	8	2,453	9	1,809	3	574	203	29,204	229	35,759	7.6	8.3
Oklahoma	2	578	4	1,049	6	1,321	1	146	28	4,006	41	7,100	1.4	1.7
Puerto Rico	6	2,014	---	---	11	2,275	5	951	725	31,154	747	36,394	24.9	8.5
South Carolina	5	1,474	4	1,110	25	5,298	3	592	106	33,098	143	41,572	4.8	9.7
Tennessee	4	1,140	2	477	7	1,589	2	432	63	7,863	78	11,501	2.6	2.7
Texas	7	2,036	5	1,534	29	6,164	4	738	210	26,948	255	37,420	8.5	8.7
Virginia	2	676	2	688	11	2,208	2	428	138	18,083	155	22,083	5.2	5.1
AEDES AEGYPTI														
Florida	1	285	---	---	20	4,289	1	164	2	661	24	5,399	0.8	1.3
Georgia	1	333	1	319	8	2,030	1	164	---	---	11	2,846	0.3	0.7
Louisiana	---	---	---	---	18	3,464	1	146	---	---	19	3,610	0.6	0.8
So. Carolina	---	---	---	---	12	1,943	1	146	2	250	15	2,339	0.5	0.5
Texas	4	998	1	175	8	1,938	1	146	21	2,990	35	6,247	1.2	1.6
H.Q. & Dist. (2)	48	14,633	9	2,535	13	2,786	82	14,122	10	1,040	162	35,116	5.4	8.2
Total	126	37,414	67	19,172	327	68,004	146	25,587	2,302	274,606	2,999	427,831	100.0	100.0
Percent of Total	4.2	8.8	2.3	4.5	11.0	16.0	4.9	6.0	77.6	64.7	100.0	100.0		

* Figures not available
(1) Includes Entomological inspectors
(2) Includes Headquarters and District Offices, malaria survey, special investigations, and employees temporarily attached to Headquarters pending assignment to states.

Malaria Control In War Areas Oct. 1943
Monthly Report

MAJOR DRAINAGE PROGRAM EXPANDED

During the agricultural off-season advantage is being taken of available farm labor to complete all necessary major drainage in existing war areas. Manpower quotas for the states are being increased where additional personnel is needed. Funds are available for this work, and such projects will be completed before the start of the 1944 mosquito breeding season. The scheduled program includes several extensive projects of the Class A type. This will reduce the number of mosquito breeding places, and release urgently needed larvicidal equipment for control operations at Army general hospitals and prisoner of war camps.

Winter drainage operations will also include the construction of a large amount of French drains. Power machines have been procured for the making of three, four, six, and eight inch tiles. Dewatering areas by the method can be accomplished at very small cost, and such systems require little maintenance.

Anopheline mosquito surveys have been made around 52 Army general hospitals, and 57 prisoner of war camps, with reports to the responsible military authorities. Surveys of the remainder will be made as rapidly as possible so that indicated control projects can be organized without delay.

"MOTHER FOCI" AEGYPTI OBJECTIVE

Personnel on most *aegypti* projects are now concentrating on knocking out "mother foci" which are responsible for carrying the species through the winter. The elimination of these over-wintering havens will materially reduce the hazards for next summer.

With the peak of the breeding season over, *Aedes aegypti* indexes dropped during the month of October on all projects except Key West and San Antonio. In the latter the index rose from 7.6 for the first half of the month to 17.4 for the last half, principally because a large number of inspections were made in outlying districts where special hazards exist. There is no piped water supply in these areas, and water for all purposes must be stored in barrels. The inspector force is inadequate for direct control, and reliance must be placed on group education.

New daily and semi-monthly report forms have been prepared and submitted to several of the projects for field tests. These new reports will facilitate analysis of data collected by the various projects, and make possible comparisons between the projects. It is planned to have these new forms in use by January first.

PUERTO RICO ALBIMANUS COUNT LOWER

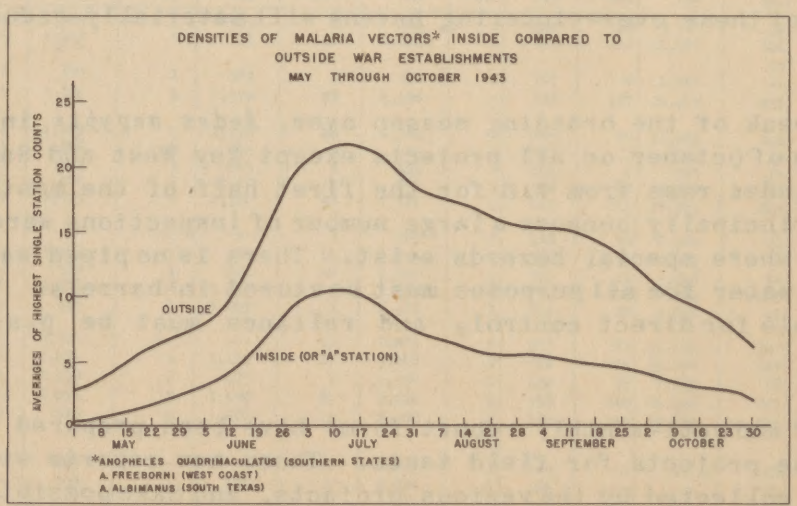
In Puerto Rico densities of the malaria vector, *Anopheles albimanus*, were significantly smaller during 1943 than in 1942 around five military installations. These were Fort Buchanan, Ensenada Honda, Losey Field, Camp O'Reilly, and Camp Tortuguero. At Losey Field the malaria incidence rate for September 1943 was the lowest ever experienced at the base, with only one new case recognized among the military personnel. That there is a correlation between the low density of the vector and the incidence of the disease is apparent, for in September 1942 the incidence of malaria at Losey Field was only one-third the September 1941 rate.

COMPLETE TOWN MOVED

An interesting phase of malaria control was completed in September by the Army at Fort Buchanan where the town of Santana was removed to a new site. Composed of 66 native houses, this town was formerly located in direct line of mosquito flight from Cucharilles Swamp to the ordnance section of Fort Buchanan. The mass movement was considered necessary because of the relatively high number of positive blood smears obtained in the village in a joint survey conducted by the U. S. Public Health Service and the Army. The move was made possible by the Army's purchase of the land upon which the village was located. Through this action the elimination of the most important focus of potential infection adjacent to Fort Buchanan was considered to be accomplished.

SEASONAL QUAD DECLINE IS NORMAL

A normal seasonal decline in *Anopheles quadrimaculatus* abundance is revealed by entomological reports received during the month of October (see accompanying chart). At the end of the month the adult densities were sufficiently low to indicate little hazard of malaria transmission in 97% of the 490 war zones under active control or surveillance by MCWA. During the month routine inspection was discontinued in 31 of the zones which were operating in September.



USDA CONTINUES DOG FLY CONTROL

The Dog Fly Control program for alleviating the nuisance caused by this pest to military personnel and war workers along the northwest coast of Florida is being conducted by the Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture, with a limited amount of cooperation by the office of Malaria Control in War Areas of the U. S. Public Health Service. The following information on the status of that project is from the progress report submitted on October 8 by Dr. S. W. Simmons, entomologist in charge of the work for the Bureau of Entomology and Plant Quarantine.

Spray operations for dog fly control are continuing, and for the season up until October 8, a total of 886,700 gallons of spray has been applied to 268 miles of grass deposits along a shoreline of 401 miles. On that date no extensive grass deposits for fly breeding remained untreated. However, new grass deposits are continually being encountered in which breeding will occur, and these deposits must be treated to prevent the emergence of flies.

In general new grass has not been deposited in as large quantities as last year, and unless high tides, winds, or other factors cause subsequent heavy grass deposits, it is likely that spray operations can be reduced gradually throughout the month of October, and terminated about November first. In fact, the discontinuance of one or two spray units is contemplated within the next week.

Fly populations have been kept very low this season. A few localized infestations of little consequence have occurred, but these have caused no interference with military operations.

"ADULT STATIONS"

Transfers:

P.A. Surgeon Trawick H. Stubbs, from MCWA Headquarters office to Malaria Investigations, Columbia, S.C.

P.A. Sanitarian (R) Fay Hemphill, from Washington to MCWA Headquarters.

Staff Additions:

Asst. Sanitarian (R) William E. Woods, to be assistant project supervisor of the Charleston, S.C. *Aedes aegypti* Control Unit.

Asst. Engineer (R) Kenneth E. Hanus, to be assistant project supervisor of the Savannah, Ga. *Aedes aegypti* Control Unit.

Asst. Sanitarian (R) Arthur E. Staebler, assigned to the Miami Quarantine Station for further training.

P.A. Engineer (R) Edward P. Mullany, assigned to the Texas State Department of Health.

Asst. Engineer (R) Clarence H. West, MCWA Headquarters, unassigned.

Table IV

MCWA Encumbrances and Liquidations by Major Items
For the Month of October 1943

	Continental U.S.	Percentage of Total	Puerto Rico	Percentage of Total
.01 Personal Services	391,437.27	83.04	36,394.40	91.00
.02 Travel	25,055.03	5.32	295.00	.72
.03 Transportation	943.50	.20	300.00	.72
.04 Communication Services	1,326.00	.29	25.00	.06
.05 Rents & Utilities	1,840.60	.39	-----	-----
.06 Printing and Binding	200.00	.04	-----	-----
.07 Other Contractual Services	19,126.71	4.05	-----	-----
.08 Supplies and Materials	28,259.59	5.99	2,966.82	7.41
.09 Equipment	3,176.49	.68	38.00	.09
Total	471,365.19	100.00	40,019.22	100.00
Expenses Other Than Personal Services	79,927.92	16.96	3,624.82	9.00

Table V

MCWA Encumbrances and Liquidations by Major Items in Continental United States
First Quarter of the Fiscal Year 1944
Adjusted Statement

	July	August	September	Total	Percentage of Total
.01 Personal Services	447,767.97	446,913.04	425,061.26	1,319,742.27	81.56
.02 Travel	21,608.95	27,300.00	20,915.00	69,823.95	4.31
.03 Transportation	5,779.00	635.00	3,184.49	9,598.49	0.59
.04 Communication Services	835.00	844.47	1,242.62	2,922.09	0.18
.05 Rents and Utilities	1,677.60	1,757.60	2,060.60	5,495.80	0.34
.06 Printing and Binding	--------	--------	450.00	450.00	0.08
.07 Other Contracuual Services	847.73	18,745.92	19,941.54	39,535.19	2.44
.08 Supplies and Materials	17,625.15	86,401.07	34,756.61	138,782.83	8.58
.09 Equipment	6,554.54	14,560.73	10,018.79	31,134.06	1.92
Total	502,695.94	597,157.83	517,630.91	1,617,484.68	100.00
Expenses other than Personal Services	54,927.97	150,244.79	92,569.65	297,742.41	18.44

DUSTING WITH PARIS GREEN FOR THE CONTROL OF *ANOPHELES QUADRIMACULATUS* IN WATER CHESTNUT COVERED AREAS OF THE POTOMAC RIVER DURING 1943

Water Chestnut or *Trapa natans* L., a fresh water plant, was first observed in the Potomac River in 1919. It spread so rapidly that by 1941 it completely or partially covered every bay or cove along the river from Washington, D. C. to Quantico, Virginia. Eradication by cutting has been carried on since 1940 by the U. S. Engineer Department, and by the end of 1942, the plant had been eliminated from many areas in the northern section of the river. These water chestnut growths are prolific *A. quadrimaculatus* breeding grounds and, because of their proximity to several military and naval establishments, malaria mosquito control measures were initiated in 1942 by the U. S. Public Health Service in cooperation with Maryland, Virginia and the District of Columbia. The vastness of these Water Chestnut areas, together with the difficulty encountered in navigating them in ordinary boats, indicated airplane dusting as the only efficient method of control. The results obtained were such as to recommend the continued use of airplane dusting during 1943.

A special unit operating out of the Headquarters Office in Atlanta in cooperation with the adjacent States and the District of Columbia executed the 1943 program, with headquarters in the District of Columbia Health Department, Malaria Control in War Areas office. The headquarters unit consisted of P. A. Engineer (R) William C. Murray, in charge of operations, and Assistant Sanitarian (R) Herbert Knutson, entomologist. The duty of the entomologist was primarily that of coordinating the inspection work of Maryland and Virginia, and the determination of the effectiveness of the dusting from which work recommendations were made to the operations officer for regulating the rate, frequency, and extent of dust applications.

The airplane dusting operations were performed by a commercial dusting company on an hourly basis. Two Stearman biplanes, each with a hopper capacity of 600 pounds of insecticide mixture, were used for the work. Turner Field, a U. S. Marine Corps flying field at Quantico, Virginia, was used as the base of operations. The planes dusted at an approximate elevation of 15 feet and at a speed of 70 miles per hour. No dusting operations were undertaken when the prevailing wind velocity exceeded six miles per hour, since higher wind velocities caused too much drift, particularly in open areas.

The larvicide used was paris green mixed with soapstone as a diluent in a 1:4 ratio by volume. A hand operated cylindrical mixer was used in mixing these ingredients.

The maximum acreage of Water Chestnut in control areas was as follows:

Ft. Belvoir		
Dogue Creek		620 acres
Gunston Cove (including Pohick Creek & Accotink Creek)		810 acres
Potomac River (Maryland side)		54 acres
	Total	1484 acres
Ft. Washington		
Potomac River (Ft. Washington - Mockley Pt.)		142 acres
Piscataway Creek		590 acres
Swan Creek and adjacent Potomac River		70 acres
	Total	802 acres
Ft. Hunt		
Little Hunting Creek & adjacent Potomac River		240 acres
Quantico Marine Barracks		
Quantico Creek & adjacent Potomac River		515 acres
Stump Neck - Naval Proving Grounds		
Chicamuxen Creek		123 acres
Indian Head - Naval Powder Factory		
Mattawoman Creek & Potomac River		30 acres

In addition to the above, 570 acres of swamp were also dusted.

The acreage dusted varied from a maximum of 3,764 acres during the week of July 4 to a minimum of 1,140 acres during the week of September 19. The average application used was 1.24 pounds of paris green per acre; at the beginning of the season (week of July 4) a minimum of 1.01 pounds per acre was applied while a maximum of 1.52 pounds per acre was applied during the height of the breeding season (week of August 20). A total of 32,536 acres were dusted during the entire season, using 40,277 pounds of paris green and requiring 243 hours and 47 minutes of dusting time. Dusting was done at seven day intervals over a period of 12 weeks, extending from the week of July 4 to the week of September 19.

Good dust coverage was indicated by routine observations of dusting operations and by the finding of low *Anopheles* larval densities within the control limits as compared to those beyond such limits. Total cost of the work including supervision, labor and materials, was $1.12 per acre per application. A summary for the season's operations showing the total acreages dusted, amounts of dust applied, dusting time, and rates of application is given in Table VI.

Table VI

Summary of Dusting Operations of Water Chestnut Areas, Potomac River, 1943

Areas	Acreage	Paris Green (lbs.)	Lbs. P.G. Per Acre	Diluent Soapstone (lbs.)	Dusting Time Hrs. Min.
Ft. Belvoir	13,429	17,858	1.34	59,949	114 - 02
Ft. Hunt	940	1,468	1.56	4,913	11 - 22
Ft. Washington	5,236	6,937	1.32	23,182	42 - 46
Indian Head	3,665	3,781	1.03	12,666	19 - 55
Stump Neck	1,086	1,580	1.46	5,304	7 - 26
Quantico	7,680	8,105	1.06	27,144	35 - 10
Areas Outside Control Zones	500	548	1.09	1,837	3 - 06
Total	32,536	40,277	1.24	134,995	243 - 47

A. quadrimaculatus made up 12% of the mosquito population of water chestnut. Fifty-five larval and fifty-three adult index stations were established and inspected weekly. Larval samplings totaled more than 110,000 for the season, and were made chiefly from airplane engine-propelled boats. In addition to several types of natural resting places, powder boxes measuring 12" x 16" x 29" were used.

The water chestnut appeared about mid-May and became dense at the end of the month. General breeding commenced at Fort Washington on about July 1, but was not general in the remaining areas of the river, including the other five military establishments, until two weeks later. During the second week in August the plant began to disappear, and by mid-September only a few patches remained. Dusting operations were initiated July 8, and continued weekly until termination on September 23. Larval counts within control limits remained low throughout the season with the exception of three isolated instances, and in each of these cases weekly dusting operations apparently were successful in preventing considerable emergence. Outside the control limits ("E" stations"), larval densities increased during the first week in August, and reached a maximum density on September 1, when 650 larvae were taken in 70 dips; following this a rapid decrease in numbers occurred.

The highest female count (during any one series of resting place examinations) inside the control limits as compared to the highest outside count, was used to determine the reduction of the potential malaria hazard accomplished by the airplane dusting. In the accompanying charts the curves representing collections outside control limits have been smoothed by application of the formula $\frac{a + 2b + c}{4}$, when "b" is the count being smoothed, and "a" and "c" the counts immediately preceding and succeeding respectively.

The only major control problem occurred at Fort Washington because of the early appearance of breeding there in advance of all other areas. This instance apparently arose from early season dispersal of numerous overwintering females from several cement blockhouses. These cement houses were located on the Fort near the water chestnut, and these females therefore oviposited in the Water Chestnut at first opportunity. Although larval density was low during early July, it was scattered over a large breeding area of 590 acres. This may

have permitted a considerable number of adults to emerge before the dusting began on July 8. This brood was concentrated in the few good natural resting places, including a target pit and the porch of a cottage, and produced high counts. It seems likely that the early season infestation of the water chestnut might be materially reduced by killing the females in these cement houses before they emerge from hibernation in the spring.

Adult collections around the remaining five military establishments remained very low, compared to those outside control limits.

Table VII gives the actual densities of larvae and adults, and the approximate percentage of overall control based on adult female collections. It varied from a minimum of 89.83% at Fort Washington to a maximum of 99.69% at Stump Neck, with a mean of 96.93% control for all military establishments. One of the important factors contributing to the success of this program is believed to have been the regulation of the frequency, rate, and extent of dust applications by entomological services, by which a close check was kept on the Anopheline populations throughout the season, and by which results of larvicidal work were determined in each specific area.

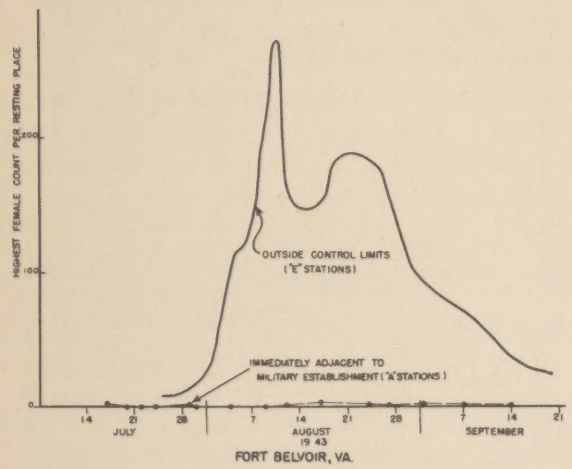
Table VII

Results of *A. quadrimaculatus* Control Work on the Potomac River; Outside Densities Compared to Those Inside

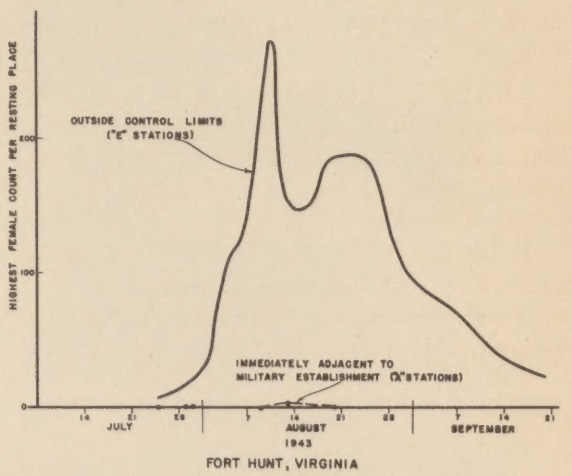
	Small larvae per 100 dips	Large larvae and pupae per 100 dips	Indicated control based on large larvae and pupae	Males per resting place	Females per resting place	Indicated control of female adults
Check ("E") Stations	44.60	40.53	0.0%	73.1	63.9	0.0%
Fort Belvoir	.60	.02	99.96%	0.7	0.9	98.59%
Fort Hunt	.08	.04	99.91%	0.4	0.4	99.38%
Quantico	.50	.16	99.61	1.6	1.6	97.50%
Fort Washington	.47	.54	98.67%	14.0	6.5	89.83%
Indian Head	.14	.01	99.98%	1.6	2.2	96.56%
Stump Neck	.44	.09	99.78%	0.1	0.2	99.69%
Mean for the six military establishments	.37	.14	99.65%	3.0	2.0	96.93%

RESULTS OF *Anopheles quadrimaculatus* CONTROL WORK ON POTOMAC RIVER

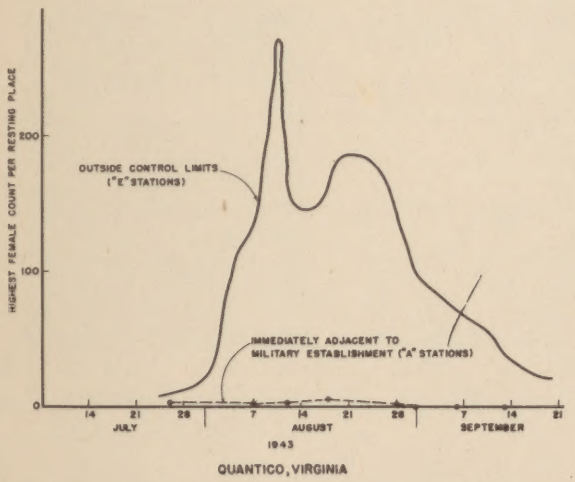
(OUTSIDE ADULT DENSITIES COMPARED TO THOSE INSIDE)



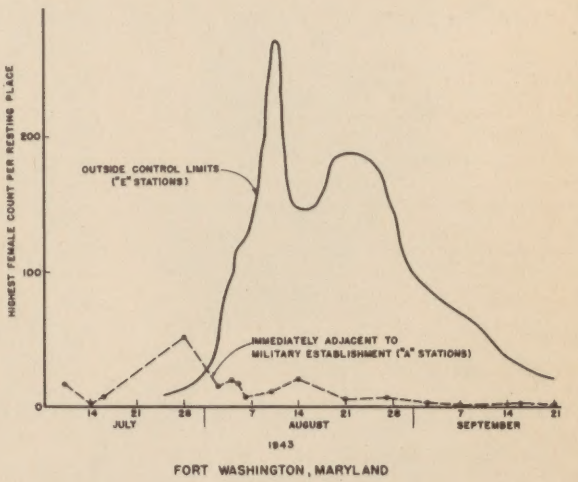
FORT BELVOIR, VA.



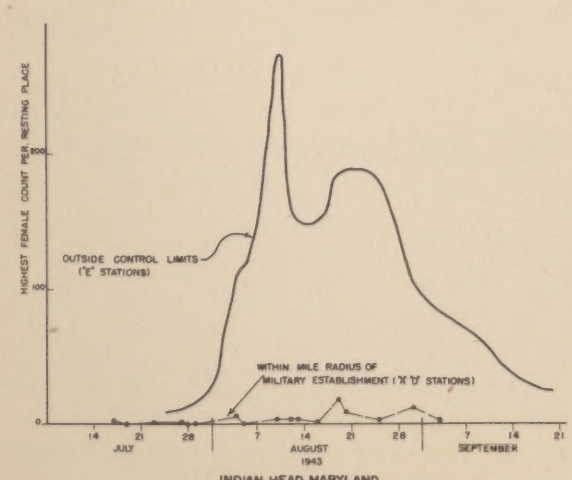
FORT HUNT, VIRGINIA



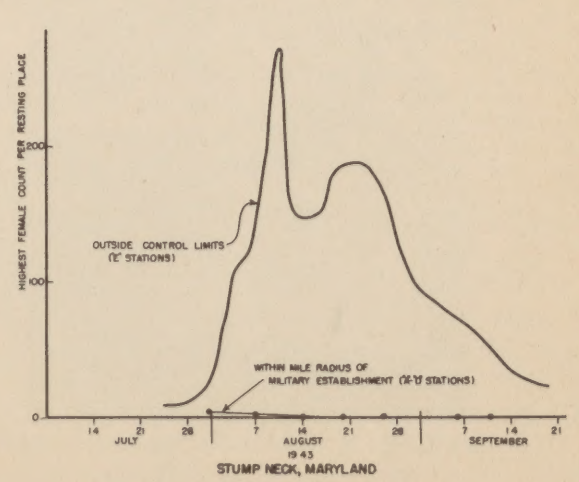
QUANTICO, VIRGINIA



FORT WASHINGTON, MARYLAND



INDIAN HEAD, MARYLAND

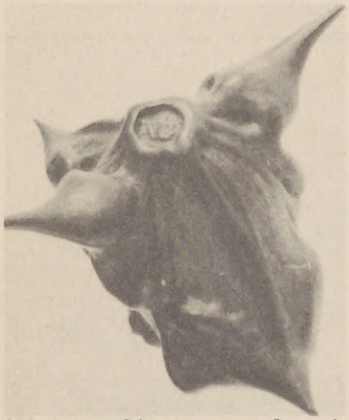


STUMP NECK, MARYLAND

Loading Plane

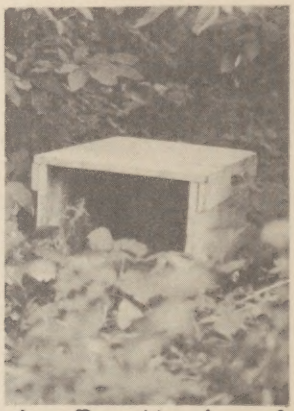
Stearman Biplane Used in Dusting

Plane Dusting Water Chestnut Area



Water Chestnut Seed

Water Chestnut Plant
(Ventral View)



Powder Box Used as Adult
Anopheline Resting Place
(Index Station)

Airplane Engine - Propelled
Boat During Inspection

Airplane Engine - Propelled Boat
Showing Power Duster

Water Chestnut, Little Hunting Creek